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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/853,289	05/09/2001	Myung-Lae Lee	51876p244	6039

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EXAMINER
KIM, RICHARD H

ART UNIT	PAPER NUMBER
2882	

DATE MAILED: 04/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/853,289	LEE ET AL.	
	Examiner	Art Unit	
	Richard H Kim	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-7 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-7 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 09 May 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 4, 6 and 7 rejected under 35 U.S.C. 103(a) as being unpatentable over Scobey (US 5,786,915) over Robinson (US 6,426,830 B1) in view of Aksyuk et al. (US 6,324,192 B1).

Referring to claim 1, Scobey discloses an optical filter comprising a fixed mirror including a number of first erecting plates; a mirror including a number of second erecting plates; and a gap disposed between both mirrors (see Fig. 6). However, the reference does not disclose a movable mirror; an air gap disposed between the fixed mirror and the movable mirror; and an actuator reciprocating the movable mirror for changing the width of the air gap, wherein the actuator includes a moving unit, which is coupled to the moving mirror, having a first electrode; a fixed unit, which is coupled to the fixed mirror, having a second electrode for generating an electrostatic force to pull the moving unit by reacting to the first electrode in order to control a gap between the moving unit and the fixed unit; and an elastic member connecting the moving unit in an adjustable manner with a predetermined ratio in order to finely control the air gap between the fixed mirror and the moving mirror.

Robinson discloses a movable mirror (see Fig. 2, ref. 30), an air gap disposed between a fixed mirror and the movable mirror (see Fig. 2, ref. 40), and an actuator reciprocating the movable mirror for changing the width of the air gap, wherein the actuator includes a moving

unit (see Fig. 2, ref. 100), which is coupled to the moving mirror (see Fig. 2, ref. 100, 30); a fixed unit (see Fig. 2, ref. 160), which is coupled to the fixed mirror (see Fig. 2, ref. 20); and an elastic member connecting the moving mirror and the moving for delivering kinetic force of the moving unit in an adjustable manner with a predetermined ratio in order to finely control the air gap between the fixed mirror and the moving mirror (see Fig. 2, ref. 100; col. 4, lines 24-51). Aksyuk discloses a moving mirror having a first electrode (see Fig. 1, ref. 23), a fixed unit having a second electrode (see Fig. 1, ref. 30) for generating an electrostatic force to pull the moving unit by reacting to the first electrode in order to control a gap between the moving unit and the fixed unit (see col. 3, lines 54-67; col. 4, lines 1-2).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a movable mirror; an air gap disposed between the fixed mirror and the movable mirror; and an actuator reciprocating the movable mirror for changing the width of the air gap, wherein the actuator includes a moving unit, which is coupled to the moving mirror, a fixed unit, which is coupled to the fixed mirror; and an elastic member connecting the moving unit in an adjustable manner with a predetermined ratio in order to finely control the air gap between the fixed mirror and the moving mirror since one would be motivated to improve the accuracy of the device. According to Robinson, such a modification would enable one to implement an "effective means for controlling the variable mirror to attain an accurate way of adjust the cavity length" (see col. 2, lines 2-5). Moreover, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have a discloses a moving mirror having a first electrode, a fixed unit having a second electrode for generating an electrostatic force to pull the moving unit by reacting to the first electrode in order to control a

gap between the moving unit and the fixed unit since one would be motivated to accurately adjust the mirror by tuning the amount of movement by adjusting the amount of electrostatic force is applied to the respective electrode. Moreover, implementing an electrostatic actuator comprising electrodes on a fixed and movable member is a well known method of actuating.

Referring to claim 4, Scobey, Robinson, and Aksyuk et al. disclose the device previously recited. However, Scobey does not disclose that the actuator includes a fixed electrode and a movable electrode, the fixed electrode being mechanically connected to the movable electrode with an elastic member intervening therebetween and the movable electrode being mechanically coupled with the movable mirror.

Aksyuk et al. discloses a fixed electrode and a movable electrode (see Fig. 1, ref. 28 and 23), the fixed electrode being mechanically connected to the movable electrode (see Fig. 1, ref. 26) and the movable electrode being mechanically connected with the movable mirror (see Fig. 1, ref. 23, 24). Robinson discloses an elastic member intervening therebetween (see Fig. 2, ref. 100; col. 4, lines 24-51).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ an actuator including a fixed electrode and a movable electrode, the fixed electrode being mechanically connected to the movable electrode with an elastic member intervening therebetween and the movable electrode being mechanically coupled with the movable mirror since one would be motivated to improve the accuracy of the device. According to Robinson, such a modification would enable one to implement an "effective means for controlling the variable mirror to attain an accurate way of adjust the cavity length" (see col. 2, lines 2-5). Moreover, such a modification would accurately adjust the mirror by tuning the

amount of movement by adjusting the amount of electrostatic force is applied to the respective electrode.

Referring to claims 6 and 7, Scobey discloses a communication device for demultiplexing/multiplexing various wavelengths, comprising an input optical fiber, a number of output optical fibers, and an array of optical filters, wherein the optical filter is regularly arranged to correspond to one input/output optical fiber (see Fig. 2-3, and col. 10, lines 35-44). Scobey further discloses an optical filter comprising a fixed mirror including a number of first erecting plates; a mirror including a number of second erecting plates; and a gap disposed between both mirrors (see Fig. 6). However, the reference does not disclose a movable mirror; an air gap disposed between the fixed mirror and the movable mirror; and an actuator reciprocating the movable mirror for changing the width of the air gap, wherein the actuator includes a moving unit, which is coupled to the moving mirror, having a first electrode; a fixed unit, which is coupled to the fixed mirror, having a second electrode for generating an electrostatic force to pull the moving unit by reacting to the first electrode in order to control a gap between the moving unit and the fixed unit; and an elastic member connecting the moving unit in an adjustable manner with a predetermined ratio in order to finely control the air gap between the fixed mirror and the moving mirror.

Robinson discloses a movable mirror (see Fig. 2, ref. 30), an air gap disposed between a fixed mirror and the movable mirror (see Fig. 2, ref. 40), and an actuator reciprocating the movable mirror for changing the width of the air gap, wherein the actuator includes a moving unit (see Fig. 2, ref. 100), which is coupled to the moving mirror (see Fig. 2, ref. 100, 30); a fixed unit (see Fig. 2, ref. 160), which is coupled to the fixed mirror (see Fig. 2, ref. 20); and an elastic

member connecting the moving mirror and the moving for delivering kinetic force of the moving unit in an adjustable manner with a predetermined ratio in order to finely control the air gap between the fixed mirror and the moving mirror (see Fig. 2, ref. 100; col. 4, lines 24-51). Aksyuk discloses a moving mirror having a first electrode (see Fig. 1, ref. 23), a fixed unit having a second electrode (see Fig. 1, ref. 30) for generating an electrostatic force to pull the moving unit by reacting to the first electrode in order to control a gap between the moving unit and the fixed unit (see col. 3, lines 54-67; col. 4, lines 1-2).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a movable mirror; an air gap disposed between the fixed mirror and the movable mirror; and an actuator reciprocating the movable mirror for changing the width of the air gap, wherein the actuator includes a moving unit, which is coupled to the moving mirror, a fixed unit, which is coupled to the fixed mirror; and an elastic member connecting the moving unit in an adjustable manner with a predetermined ratio in order to finely control the air gap between the fixed mirror and the moving mirror since one would be motivated to improve the accuracy of the device. According to Robinson, such a modification would enable one to implement an "effective means for controlling the variable mirror to attain an accurate way of adjust the cavity length" (see col. 2, lines 2-5). Moreover, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have a discloses a moving mirror having a first electrode, a fixed unit having a second electrode for generating an electrostatic force to pull the moving unit by reacting to the first electrode in order to control a gap between the moving unit and the fixed unit since one would be motivated to accurately adjust the mirror by tuning the amount of movement by adjusting the amount of electrostatic

force is applied to the respective electrode. Moreover, implementing an electrostatic actuator comprising electrodes on a fixed and movable member is a well known method of actuating.

3. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Scobey, Robinson, and Aksyuk et al., in view of Tayebati (US 6,324,192 B1).

Scobey, Robinson and Aksyuk et al. disclose the device previously recited. Scobey does not disclose that the movable mirror further includes an oxide layer formed below the second erecting plates and functioning as a sacrificial layer.

Tayebati discloses a sacrificial layer formed below the second erecting plates (see col. 6, lines 19-31). Aksyuk et al. discloses an oxide sacrificial layer (see col. 8, lines 17-18).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have an oxide layer formed below the second erecting plates and functioning as a sacrificial layer in order to improve the ease of fabrication of the device. According to Tayebati, "by selectively removing the sacrificial layer, the top mirror can be machined into a cantilever of a platform. In this case, the cantilever or platform contains the top distributed Bragg reflector, whereas the substrate contains the bottom DBR of the Fabry-Perot structure. The two mirror are now separated by an air gap, and this gap can be changed by applying an electric field to the top and bottom electrodes of the deice which makes it possible to tune the resonant frequencies of the device" (see col. 6, lines 23-31). Further, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice *In re Leshin, 125 USPQ 416.*

4. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Scobey, Robinson and Aksyuk et al., in view of Kubota et al. (U.S. 4,751,509).

Scobey, Robinson and Aksyuk et al. disclose the optical tunable filter previously recited. However, the references do not disclose the optical tunable filter wherein each of the erecting plates are made of silicon and has a thickness determined but the equation, $(2m+1)\lambda/4n$, and the air gap has a width determined by an equation of $(2m+1)\lambda/4$.

Aksyuk et al. discloses erecting plates made of silicon (see col. 7, lines 25-27). Further, Kubota et al. disclose a thickness determined by the equation $(2m+1)\lambda/4n$ (see col. 4, line 51).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teachings of Scobey and Durand et al. such that the tunable filter includes erecting plates made of silicon since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice *In re Leshin, 125 USPQ 416,* and further for silicon's insulating properties, thereby preventing overheating of the device from the mirror. Moreover, it would have been obvious to one having ordinary skill in the art at the time was made to modify the teachings of Scobey and Durand et al. in order for the tunable filter comprise of erecting plates with a thickness determined by the equation $(2m+1)\lambda/4n$, since such an equation is known in the art to determine the thickness of a structure, given the wavelength and the refractive index of a material. It is noted by the examiner that the refractive index of air is known to be approximately one, yielding the equation $(2m+1)\ \lambda/4$ for the width of the air gap. Further, it would have been obvious to one having ordinary skill in the art at the time the invention was

made to manipulate an already known formula in order to produce a desired result given known parameters of a device.

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Scobey, Robinson, and Aksyuk et al., in view of Tam (US 5,990,769) and Fujita et al. (U.S. 4,887,109).

Scobey, Robinson, and Aksyuk et al. disclose the apparatus previously recited. However, the references do not disclose that the elastic member is a leaf spring made of silicon and a link lever intervenes between the leaf spring and the movable electrode for reducing displacement of the movable mirror.

Tam discloses a leaf spring disposed between two contacts (see col. 1, lines 52-55). Fujita et al. discloses a link lever disposed adjacent to a spring, and proximate to an actuating device (see col. 4, lines 59-63).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teaching of Scobey, Robinson and Aksyuk et al. to have the device include a silicon leaf spring as the elastic member and a link lever intervening between the leaf spring and the moveable electrode in order for the leaf spring to urge the two electrodes into a first position and a second position, as disclosed in col. 1, lines 52-64, which would cause the mirror to move, thereby adding controllability to the device. Further, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the device include a silicon leaf spring as the elastic member and a link lever intervening between the leaf spring and the moveable electrode in order for the link lever to decrease the elasticity of the leaf spring, since the link lever is a strictly rigid and inelastic element, thereby adding a more

controlled movement of the device. Moreover, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the leaf spring made of silicon, since it is known in the art that silicon is an effective insulator and would guard against excessive heat transfer from one electrode to the other.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard H Kim whose telephone number is (703)305-4791. The examiner can normally be reached on 8:30-5:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H Kim can be reached on (703)305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7722 for regular communications and (703)308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Richard H Kim
Examiner
Art Unit 2882

RHK
April 7, 2003